

DISTOCAMBARUS (DECAPODA: CAMBARIDAE)
ELEVATED TO GENERIC RANK, WITH AN ACCOUNT OF
D. CROCKERI, NEW SPECIES, FROM
SOUTH CAROLINA

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Abstract.—The previously monotypic subgenus *Distocambarus* proposed by Hobbs, 1981, is elevated to generic status, and a new species, *Distocambarus crockeri*, is described from the Savannah River basin of the Piedmont Province of South Carolina. The genus now embraces two species: *Distocambarus devexus* (Hobbs, 1981) of the Savannah piedmont of Georgia and *D. crockeri* which frequents the piedmont section of the same river basin in South Carolina. Both members of the genus are primary burrowers.

In describing *Procambarus* (*Distocambarus*) *devexus* "from the Piedmont Province in the Broad River basin (Savannah River watershed) of Oglethorpe and Wilkes counties, Georgia," Hobbs (1981:306) chose the subgeneric name to denote his conviction of the remoteness of this crayfish from all known members of the genus. He pointed out its similarities to members of the subgenera *Girardiella*, *Capillicambarus*, *Leonticambarus*, and *Villalobosus* and to "certain members of the genus *Fallicambarus*," but he emphasized its distinctive features. With the discovery of a close ally of this disjunct species occupying the Savannah basin in the Piedmont Province of South Carolina, we believe that these two crayfishes, exhibiting such a combination of unique and distinctive characters (see the discussion of "Relationships" below), should be recognized at the generic level. Therefore we propose that the subgenus *Distocambarus* be elevated to generic rank, and that it encompass *Distocambarus devexus* (Hobbs) and the new species described herein.

Genus *Distocambarus*

Subgenus *Distocambarus* Hobbs, 1981:301 [Type-species, *Procambarus* (*Distocambarus*) *devexus* Hobbs, 1981:302].

Diagnosis.—Antennal flagellum never with conspicuous fringe on mesial border. Third maxilliped with teeth on mesial margin of ischium. Mesial margin of palm of chela with row of as many as 8 tubercles; lateral margin of fixed finger never bearing spiniform tubercles; opposable margin of dactyl with shallow excision proximally. Areola 8 to almost 40 times as long as broad. Ischium of third pereiopod only with hook. Coxa of fourth pereiopod lacking caudomesial boss. First pleopods of first form male symmetrical, widely separated at base, bearing prominent caudoproximal lobe, flexed caudally slightly distal to midlength, and partly concealed by sternal setae extending from ventrolateral part of sternum and coxae of third, fourth, and fifth pereiopods; terminal elements consisting of subtriangular to subconical mesial process, directed caudally to caudodistally,

and similarly disposed platelike to bladelike central projection; cephalic process, if present, represented by small rounded to subacute knob on cephalodistal end of appendage; sternite corresponding to fourth pereopod conspicuously produced ventromesially. Female with annulus ventralis hinged anterodorsally and moving through arc of 30 to 90 degrees; sternal plate immediately anterior to annulus with narrow median fissure; first pleopod represented by inconspicuous tuberculiform swelling. Branchial count 17 + epipodite.

Distocambarus crockeri, new species

Diagnosis.—Body and eyes pigmented, latter small but well developed. Rostrum without marginal spines, tubercles, and median carina. Carapace with one to several small cervical tubercles. Areola 7.3 to 13.9 (average 10.2) times as long as broad, and constituting 37.6 to 40.9 (average 39.0) percent of entire length of carapace (42.7 to 48.4, average 45.3, percent of postorbital carapace length). Ventral surface of ischium of third maxilliped only partly obscured by plumose setae. First 3 pairs of pereopods without conspicuous brush of setae extending from basis to merus. First pair of pereopods with ventral surface of merus densely tuberculate and corresponding surface of proximal part of both fingers tuberculate. Second pair of pereopods with conspicuous brush of setae on carpus and propodus. First form male with simple hook on ischium of third pereopod only; coxa of fourth pereopod lacking caudomesial boss. First pleopods widely spaced at base, symmetrical, reaching coxae of third pereopods, with proximomedian lobe but without proximomesial spur; cephalic surface with weak shoulder near bases of terminal elements; subapical setae absent; shaft of appendage bent caudodistally near midlength at angle of approximately 40 degrees; terminal elements restricted to slender, tapering, distally directed mesial process, and short, subquadrate, platelike, corneous central projection directed caudodistally and rather strongly mesially; cephalic process absent. Mesial ramus of uropod with small distomedian spine premarginal. Female with annulus ventralis capable of arclike motion in longitudinal axis of body; large postannular sclerite abutting but not covering part of annulus; first pleopods consisting of rudiment in form of small tuberculiform protrusion from sternum.

Holotypic male, form I: Cephalothorax (Fig. 1a, i) subovate, compressed laterally; maximum width of carapace slightly greater than height at caudodorsal margin of cervical groove (15.2 and 14.5 mm). Abdomen narrower than thorax (12.3 and 15.2 mm). Areola 10.0 times as long as wide with 2 rows of punctations across narrowest part. Cephalic section of carapace about 1.6 times as long as areola, latter comprising 38.3 percent of total length of carapace (45.8 percent of postorbital carapace length). Surface of carapace distinctly punctate dorsally becoming weakly granulate laterally, tubercles slightly larger in hepatic region than on most of branchiostegite but largest in anteroventral branchiostegal area. Rostrum broad, gently rounded apically with short triangular acumen reaching midlength of distal podomere of antennular peduncle; margins not thickened; upper surface shallowly excavate with usual submarginal punctations and scattered moderately large ones. Subrostral ridge clearly defined. Suborbital angle subacute and rather prominent. Postorbital ridge moderately strong, ending somewhat abruptly anteriorly, neither spine nor tubercle present. Branchiostegal spine small

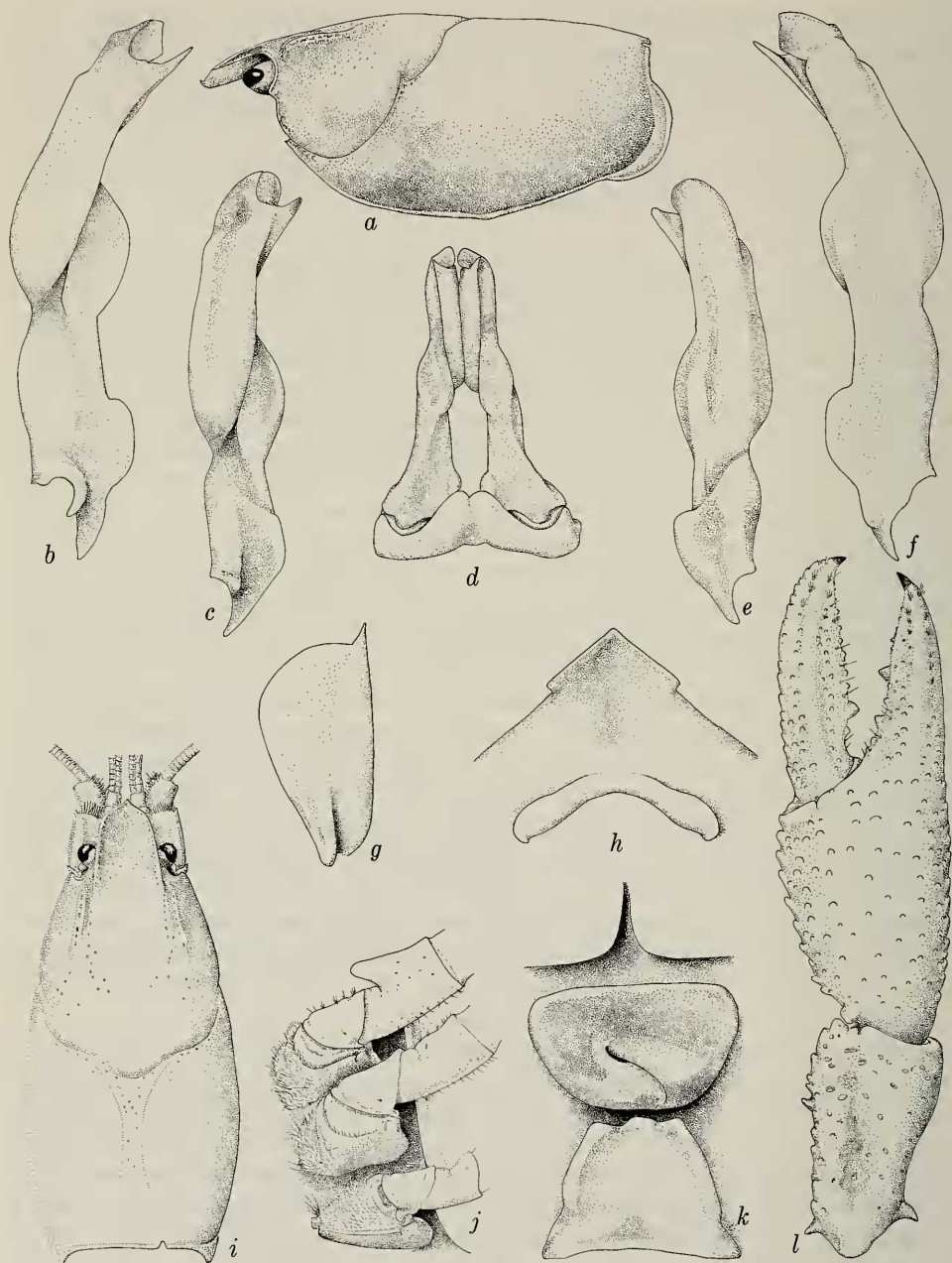


Fig. 1. *Distocambarus crockeri* (all illustrations from holotype except c, e from morphotype, and k from allotype): a, Lateral view of carapace; b, c, Mesial view of first pleopod; d, Caudal view of first pleopods; e, f, Lateral view of first pleopod; g, Antennal scale; h, Epistome; i, Dorsal view of carapace; j, Proximal podomeres of third, fourth, and fifth pereopods; k, Annulus ventralis; l, Dorsal view of distal podomeres of cheliped.

but acute; cervical spine absent but row of small tubercles along posterior side of region of junction of anterior and posterior arms of cervical groove.

Abdomen shorter than carapace (26.6 and 31.3 mm). Pleura of second through fifth abdominal segments broadly rounded to subtruncate ventrally, lacking caudoventral angles. Cephalic section of telson with 2 spines (more mesial one movable) in each caudolateral corner. Cephalic lobe of epistome (Fig. 1h) triangular, anterolateral margins elevated ventrally; main body of epistome with anteromedian depression but lacking fovea; epistomal zygoma broadly arched. Ventral surface of proximal podomere of antennular peduncle with very small spine distinctly distal to midlength. Antennal peduncle without tubercles and spines on basis and ischium; flagellum with distal articles lacking but reaching second abdominal tergum. Antennal scale (Fig. 1g) about 2.1 times as long as broad, widest distal to midlength; greatest width of lamellar area almost twice that of thickened lateral part.

Third maxilliped extending anteriorly beyond antennal peduncle by length of dactyl and half that of propodus; mesial sector of ventral surface of ischium densely clothed in long plumose setae; lateral sector with closely spaced shorter ones proximally and yet shorter, more widely placed ones distally; distolateral margin of article produced in short spine; merus with setae similarly disposed.

Right chela (left probably regenerated) (Fig. 1l) subelliptical in section, somewhat depressed; mesial margin of palm 1.1 times as long as greatest width, former about two-fifths that of length of palm; almost entire surface of palm with squamous to subsquamous tubercles. Mesial margin of palm with row of 8 (right) or 6 (left) tubercles flanked dorsally by row of 8 (right) or 6 (left) and irregular ventral row of 8, few additional tubercles present between rows; ventral surface with 2 prominent tubercles opposite base of dactyl. Both fingers with moderately well defined dorsomedian ridges; that on fixed finger flanked along proximal half by tubercles and distally by row of punctations, that on dactyl by tubercles along proximal three-fourths and by punctations distally. Opposable margin of fixed finger with row of 9 (right) or 7 (left) tubercles, second from base largest, scattered along almost entire length of fingers, and single row of minute denticles extending between, and some under, tubercles; 2 tubercles also present slightly below row: larger one at about midlength and smaller at about base of apical third of finger; lateral surface with row of tubercles on proximal third replaced along distal part of finger by row of setiferous punctations. Opposable margin of dactyl with row of 10 (right) or 11 (left) tubercles, second from base largest, dispersed along almost entire length of finger, interrupting row of minute denticles; basal fourth of margin shallowly excavate; mesial surface of dactyl tuberculate with row extending from base almost to corneous tip of finger, becoming subacute on distal part of podomere; ventral surface of fingers with tubercles flanking median ridge proximally and punctations distally.

Carpus of cheliped distinctly longer than mesial margin of palm (10.5 and 8.1 mm), its dorsal surface with broad, slightly sinuous, shallow furrow extending from almost 0.2 length of podomere from proximal end to about same distance from distal end, and with scattered punctations and few tubercles proximomesially; mesial surface with irregular dorsal row of 7 or 8 small tubercles below which 14 or 15 additional tubercles, only one of which decidedly larger than

others, also present, and premarginal setal band distomesially; distoventral margin of carpus with 2 tubercles, larger, more lateral one bearing articular socket receiving ventrolateral condyle of propodus.

Merus with usual tubercles dorsally, none acute, and more distal ones not conspicuously larger than several proximal to it; mesial and lateral surfaces mostly smooth, but distomesial area bearing number of very small tubercles; ventral surface studded with crowded tubercles, irregular mesial and lateral rows consisting of 15 or 16 tubercles, spiniform. Ischium with row of 4 small tubercles mesially.

Hook on ischium of third pereopod (Fig. 1j) simple, comparatively heavy, and overreaching basioischial articulation, latter not opposed by tubercle on basis. Coxa of neither fourth nor fifth pereopods with boss; ventral membrane of coxa of fifth conspicuously setose.

Sternum between third pereopods rather shallow; that between both fourth and fifth comparatively deep; lateral part of that between fourth produced ventrally in moderately strong, posteroventrally projecting lobe. Plumose pubescence associated with sternum and coxae of all pereopods very prominent.

First pleopods (Fig. 1b, d, f) as described in "Diagnosis." Uropods with both lobes of proximal podomere bearing acute corneous spines; mesial ramus with distomedian spine small and situated premarginally.

Allotypic female: Differing from holotype, other than in secondary sexual features, in following respects: areola 9.6 times as long as broad; postcervical groove, which not evident in holotype, clearly defined and situated 0.2 areola length posterior to cervical groove; tubercles on carapace much weaker; rostrum almost reaching distal margin of ultimate podomere of antennular peduncle. Suborbital angle weak and obtuse; branchiostegal spine smaller but distinct; only 1 or 2 cervical tubercles present; third maxilliped only slightly overreaching antennal peduncle. Length of mesial margin of palm of chela equal to width and about 0.4 as long as chela; only 1 tubercle (injured) on ventral surface at base of dactyl; opposable margin of fixed finger with only 1 tubercle below principal row; 7 tubercles on corresponding margin of dactyl, and more mesial of 2 tubercles on distoventral margin of carpus less conspicuous than in holotype. (See measurements in Table 1.)

Annulus ventralis (Fig. 1k) 1.7 times as wide as long, hinged cephalically, moving through arc of 90 degrees, D-shaped with anterior margin almost straight and slightly elevated; ventral surface sloping posteriorly and mesially from anterolateral angles; sinus almost straight, beginning at about midlength of annulus, slightly dextral to median line, and extending caudosinistrally, ending on caudosinistral wall of annulus; sinistral wall of sinus increasing in height posteriorly, forming conspicuous prominence on caudal wall. Postannular sclerite subtrapezoidal in shape, its maximum width 1.5 times its length; sclerite 0.9 as wide and 0.9 as long as annulus, its anteroventral margin with symmetrical pair of broad excavations rendering margin with 3 short rounded projections.

Sternum anterior to annulus with narrow, median, longitudinal cleft. First pleopod represented by tuberculiform rudiment.

Morphotypic male, form II: Differing from holotype, other than in development of secondary sexual characters, in only few minor respects: epistome, while subtriangular, with more irregular anterolateral margins; mesial margin of palm of

Table 1.—Measurements (mm) of *Distocambarus crockeri*.

	Holotype	Allotype	Morphotype
Carapace			
Entire length	31.3	34.6	23.8
Postorbital length	26.2	29.5	20.4
Width	15.2	16.2	11.1
Height	14.5	15.0	10.5
Areola			
Width	1.2	1.4	1.1
Length	12.0	13.5	8.9
Rostrum			
Width	5.0	5.7	4.0
Length	6.8	7.0	5.1
Right chela			
Length, palm mesial margin	8.1	9.2	4.9
Palm width	7.6	9.2	5.2
Length, lateral margin	20.8	21.4	12.5
Dactyl length	6.9	12.7	7.2
Abdomen			
Width	12.3	13.8	9.0
Length	26.6	31.8	23.3
Carpus of cheliped			
Width	5.7	6.2	3.7
Length	10.5	10.8	6.4

chela with row of 8 or 9 tubercles; opposable margin of fixed finger with row of 3 or 4 tubercles along proximal half, and corresponding margin of dactyl with 2 tubercles representing proximal 2 in holotype. (See measurements in Table 1.)

Hook on ischium of third pereopod much less conspicuous and not projecting over basioischial articulation. First pleopod (Fig. 1c, e) not distinctly reflexed; mesial process longer and distal part more slender than in holotype; central projection rounded and non-corneous but disposed as in holotype; juvenile suture evident.

Color notes.—(Based upon specimens from burrows at junction of U.S. Highway 378 and County Road 423, northwest of Edgefield, Edgefield County, South Carolina.) Ground color shades of brown. Dorsum of cephalic region and areola dark brown, rostral margins and V-shaped marking in posterior gastric region almost black; areola flanked by grayish brown longitudinal stripes which flanked laterally by dark chocolate stripes extending from cervical groove to posterior margin of carapace; lateral surface of branchiostegites with irregular tan splotches on brown fading ventrally from just-mentioned chocolate stripe to pale brown along ventral margin. Abdomen with orange tan dorsomedian stripe flanked by broad dark chocolate stripes (continuous with those on carapace) extending from first to anterior part of sixth segment; terga ventrolateral to chocolate stripe tan with reticulate darker brown mottlings; pleura, except for anteroventral tan sections, bearing reticulate pattern of dark brown; tergum of sixth segment, telson, and uropods with brown mottlings on tan. Cheliped basically dark tan with brown tubercles; very dark brown markings on distal margin of merus, dorsolateral

surface of carpus, dorsomesial part of palm, and dorsal part of fingers; tips of latter reddish orange; remaining pereopods with broad irregular bands, darker at distal ends of podomeres; merus and carpus each with proximal and distal bands.

Type-locality.—Roadside ditch 0.7 miles south of Parksville, McCormick County, South Carolina, on U.S. Highway 221. The ditch from which the specimens were dug was partly shaded by trees of the genera *Pinus*, *Juniperus*, and *Acer* and had been scraped in making road repairs. Water stood in the lower section, and many burrows that were not inundated were surrounded by pellets composed of sandy clay that recently had been brought to the surface. The burrows were comparatively simple: none that were excavated had more than three openings, and although branching, possessed only one deep passage. Some of the burrows contained several individuals, but whether or not the multiple occupancy resulted from the young-of-the-year not having left the parent burrow could not be determined. Burrows elsewhere containing more than one individual housed only a first form male and a female, or a female with few to several juveniles. No other crayfish species was found in the colony at this locality.

Disposition of types.—The holotypic male, form I, the allotype, and the morphotypic male, form II, are deposited in the National Museum of Natural History (Smithsonian Institution), nos. 178582, 178583, and 178584, respectively, as are the paratypes consisting of 7 males, form I, 2 males, form II, 15 females, 7 juvenile males and 7 juvenile females.

Size.—The largest specimen available is a first form male having a carapace length of 34.7 mm (postorbital carapace length 30.0 mm); corresponding lengths of the smallest first form male are 27.8 (24.1) mm, and those of the largest female, the allotype, 34.6 (29.5) mm. Oviparous females have not been found.

Range and specimens examined.—This crayfish appears to be restricted to the eastern watershed of the Savannah River in the Piedmont Province of South Carolina. Specimens have been examined from the following localities: MCCORMICK COUNTY—(1) type-locality, 1 ♂I, 1 ♂II, 4 ♀, 4 j♂, 5 j♀, 19 Apr 1981, G. B. Hobbs, J. E. Pugh, HHH; (2) roadside seepage area 0.9 mi S of Abbeville Co line on Co Rd 81, 1 ♂I, 1 ♀, 1 j♂, 18 Apr 1981, GBH, JEP, HHH; (3) roadside ditch 0.5 mi E of Stephens Cr on St Rte 283, 2 ♀, 1 j♂, 24 Apr 1982, GBH, HHH. ABBEVILLE COUNTY—(4) seepage and wet area around farm pond 2.6 mi NE of Calhoun Falls on St Rte 72, 2 ♂I, 17 Apr 1981, JEP, HHH; (5) roadside ditch 100 yds S of Gill Creek on Co Rd 32, 1 ♂I, 1 ♀, 25 Apr 1982, GBH, HHH. EDGEFIELD COUNTY—(6) roadside ditch at westernmost tributary to Rocky Creek at U.S. Hwy 378, 2 mi W of Co Rd 51, 1 ♂I, 1 ♂II, 4 ♀, 1 j♂, 2 j♀, 9 Apr 1982, P. H. Carlson and E. M. Younginer; (7) roadside ditch at jct of U.S. Hwy 378 and Co Rd 423, NW of Edgefield, 2 ♂I, 1 ♂II, 4 ♀, 24 Apr 1982, GBH, HHH. (Burrows of *Cambarus (D.) latimanus* (LeConte) were excavated within a meter of that of one of these specimens.)

Variations.—Although there are many minor variations among the specimens that have been examined, none involves the differences between this and closely or distantly related species. The rostral margins are often more strongly convergent than that illustrated, and the carpus of the cheliped may not be so narrow as that reported for the holotype, but never are there massive tubercles on the

mesial surface of the latter; always the carpus appears abnormally long, and though tuberculate, the mesial surface lacks the conspicuously dominant major spine that is typical of most crayfishes in the eastern part of the United States. The only difference noted in the first pleopods of the first form male in specimens from the few localities from which they are available is in the degree of sclerotization of the central projection, but none of the variations seems to be correlated with specimens from a restricted part of the range of the species.

Relationships.—*Distocambarus crockeri* is more closely allied to *D. devexus* than to any other crayfish. Except for references to the secondary sexual features, most of the description of the latter (Hobbs 1981:302) applies quite well to *D. crockeri*. The only striking differences between the two exist in features of the first pleopod of the male and those of the annulus ventralis. Ecologically, one appears to vicariate for the other on opposite sides of the Savannah River. Whereas their broad areolae and ungainly legs suggest a better adaptation to life in surface lentic or lotic habitats, both are primary burrowers. Their relationships to other members of the Cambarinae are not understood, but perhaps the kinships suggested by Hobbs (1981:43, and fig. 11) are not totally erroneous.

These two crayfishes may be distinguished from all others by the following combination of characters: rostrum without marginal spines; ventral surface of merus of cheliped densely tuberculate; ischia of only third pereopods with hooks; coxae of fourth pereopods without caudomesial boss; first pleopods of first form male symmetrical, widely separated basally, with prominent caudoproximal lobe, deflected caudadistally near midlength, and lacking caudal process; carpus of cheliped twice as long as wide; annulus ventralis moving through arc of approximately 90 degrees; postannular sclerite large and platelike; and sternum of female anterior to annulus narrowly cleft.

Distocambarus crockeri may be separated from *D. devexus* by the first pleopod of the male, which lacks a cephalic process and possesses a more acute mesial process and a much larger quadrangular central projection, and by the annulus ventralis which when depressed is not partly overlapped by the postannular sclerite.

Ecological notes.—The burrows of *Distocambarus crockeri* do not differ in any obvious way from those of *D. devexus*, which Hobbs (1981:307) described as "moderately complex." Most of those excavated had two or three passageways leading to the surface, at least one topped by a crude turret; these tunnels converged to form one subvertical gallery that penetrated the water table and occasionally branched into two or three passages directed downward; all ended blindly, in some instances more than a meter below the surface. Burrows were found in seepage areas, bogs, and in both waterlogged and comparatively dry roadside ditches. In all except one of the localities, clumps of a sedge, 0.3 to 0.6 m in height, were among the most conspicuous plants present. In fact, the presence of the sedge led one of us (H.H.H.) to choose collecting sites where this crayfish was found as he was driving along the county roads and highways. (See "Type-locality.")

Etymology.—This crayfish is named in honor of Denton W. Crocker, a fellow student of crayfishes and a friend, whose contributions to our knowledge of the American crayfish fauna are invaluable.

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